QUESTION BANK ON POWERSTATION ENGINEERING

(MECHANICAL ENGINEERING - 6TH SEM)

PREPARED BY

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Part-A (10 x 2 = 20 Marks) **Marks**

UNIT-I COAL BASED THERMAL POWER PLANTS

1	What do you understand by the term boiler draught?	2
1	Define steam rate and heat rate.	2
1	List the factors to be considered while choosing a site for steam power station.	2
1	What is meant by cooling Towers?	2
1	What is crusher and its crushing method?	2
1	List out the advantages of high pressure boilers in modern thermal power plant.	2
1	List out the different circuits of thermal power plant.	2
1	What are the requirements of a modern surface condenser?	2
2	Difference between impulse and reaction turbine.	2
2	What is the purpose of condenser?	2

2	What is ESP? State its use.	2
2	Distinguish between Forced draught and induced draught.	2
2	Define Fluidization?	2
2	What are the modern trends in generating steam of high pressure boiler?	2
2	List down the important parameter of turbine.	2
2	What is a stoker? Classify it.	2
2	What is mean by cogeneration system?	2

UNIT-II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS

3	How diesel power plants are classified?	2
3	Name the components of diesel power plant.	2
3	How diesel engines are classified?	2
3	How gas turbines are classified?	2
3	What are the different types of fuel used in gas turbine?	2
3	Name the material used in rotor of the gas turbine.	2
3	Define IGCC?	2
4	What is the purpose of regenerator?	2
4	Classify the types of combined cycle plants.	2

4	What the effects are of inter cooling in gas turbine power plant.	2
4	What is the difference between open cycle and closed cycle gas turbine power plant?	2
4	Name the fuel used in gas turbine.	2
4	What is the environmental impact of a combined cycle plant?	2

UNIT-III NUCLEAR POWER PLANTS

5	What do you understand by moderation?	2
5	How the nuclear reactors are classified?	2
5	What is chain reaction?	2
5	What is fast breeder reactor? List down any two types.	2
5	Name the coolants used for fast breeder reactor.	2
5	List out the desirable properties of a coolant?	2
5	Define the term "Breeding".	2
5	Define multiplication factor?	2
5	List down the nuclear disposal methods.	2
6	What is LMFBR?	2
6	List various control rods used in nuclear power reactor.	2
6	Explain the function of cladding? What are the criteria for selecting cladding.	2
6	Name the coolants used in gas cooled reactor.	2
6	List down the nuclear waste disposal methods.	2
6	Name the different components of Nuclear Reactor.	2
6	Name the coolants commonly used for fast breeder reactors.	2
6	Name the coolants used in gas cooled reactor.	2

UNIT-IV POWER FROM RENEWABLE ENERGY

7	What is the purpose of surge tank?	2
7	What are the factors to be considered while selecting the layout of a Hydel powerplant?	2
7	Describe the operating principle of a hydroelectric power plant.	2
7	What is the use of spillway?	2
7	Name some typical components of a wind mill.	2
7	What is bio gas? Give the advantages	2
7	Explain how a fuelcell works?	2
7	What are the different types of geothermal power plant?	2
8	What are the different types of receivers and heliostats used in solar power plant?	2
8	What is OTEC?	2
8	What are components used in tidal power plant?	2
8	What do you understand by tip-speed ratio?	2
8	What do you understand a solar photo voltaic power system?	2
8	Name the different types of fuel cells.	2

UNIT-V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS

9	Explain the different types of tariffs?	2
9	What are the different methods used to calculate depreciation cost of power plant?	2
9	Define Load factor and Plant use factor.	2
9	Define diversity factor.	2
9	Define peak diversity factor.	2
9	Define plant capacity factor.	2
9	Define Load curve.	2
9	Name some power plant pollutants of major concern?	2
9	Point out the waste disposal options for Nuclear Power Plant?	2
10	What is particulate emission?	2
10	Define thermal discharge index?	2
10	Name the methods of storage or disposal of radioactive waste material?	2
10	How the tariff for electricity energy is arrived?	2
10	List the various cost which constitute the total cost of power generation.	2
10	Define demand for electricity?	2
10	What do you understand by load curve?	2

Part-B (16 x 5 = 80 Marks)

UNIT-I COAL BASED THERMAL POWER PLANTS

11.a	Draw a general layout of thermal power plant and explain the working of different circuits.	16
11.a	Draw a neat diagram and explain any two sub critical boiler.	16
11.a	(i) What do you understand Fluidized bed combustion and explain in detail (8) (ii)Name the different types of condenser. Describe the operation of a surface condenser.(8)	16
11.a	With the help of neat sketch describe the working of any one type of ash handling system.	16
11.a	Explain the different types of draught systems with sketches.	16
11.a	Explain briefly the basic Rankine cycle of a thermal power plant. List out the major components and explain their functions.	16
11.b	Explain in detail about mechanical dust collector and Electrostatic precipitator. Why both are used over a single unit in modern power plants.	16
11.b	Explain the working principle of turbine with neat sketch.	16
11b	Explain the working principle of steam condenser and its types with neat sketch.	16
11.b	Explain the different types of Pulverizing mill.	16
11.b	Explain in details the coal handling system with a suitable block diagram	16

UNIT-II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS

12.a	Explain the working principle of diesel power plant with neat sketch.	16

12.a	Explain the working principle of gas power plant with neat sketch.	16
12.a	Explain the improvement of thermal efficiency gas power plant with neat sketch.	16
12.a	Explain the stem and gas power generation cycle in gas power plant.	16
12.a	(i) Discuss the effect of pressure ratio on Brayton cycle output and efficiency.(8) (ii) Explain the integrated gasifier based combined cycle system. (8)	16
12.a	i) How can a combined cycle plant be used for cogeneration? What is itsthermodynamic advantage?(8) ii) Discuss the advantages of combined cycle power generation. Why is it so important in the present day energy scenario?(8)	16
12.b	Discuss the working of various types of combined cycle power plant.	16
12.b	(i) With an aid of a block diagram, explain the working principle of a closed cycle gas turbine plant.(10) (ii) Explain how do you select engine for a diesel power plant?(6)	16
12.b	(i)Write a note on fuel system of diesel power plant.(8) (ii)Explain how reheating improves the efficiency of a simple open cycle gas turbine plant.(8)	16
12.b	Explain the working principle of type's gas power plant with neat sketch.	16
12.b	(i) Give the classification of gas turbine power plants.(8) (ii)Bring out the difference between the closed cycle and open cycle gas turbine power plants.(8)	16

UNIT-III NUCLEAR POWER PLANTS

13.a	Explain the working principle of nuclear power plant with neat sketch.	16
13.a	How are nuclear reactors classified? Describe some common types of reactors used for electric power plants.	16
13.a	(i) Discuss about a breeder reactor.(8) (ii)Explain the working of a typical fast breeder nuclear reactor power plant, with neat diagram. (8)	16
13.a	Explain the working principle of pressurized water reactor with neat sketch.	16
13.a	Explain the working principle of boiling water reactor with neat sketch.	16
13.b	Explain Canadian-Deuterium-Uranium reactor with neat sketch also mention its merits and demerits.	16
13.b	(i) What are the difference between a pressurized water reactor nuclear power plant and boiling water reactor nuclear power plant? (8) (ii)Explain the following terms: (a) Fission of nuclear fuel (b) Distribution of fission energy (c) The chain reaction. (8)	16
13.b	(i) Generalize the Safety measures for Nuclear Power plants? (8) (ii) Write notes on the hazardous effects of nuclear materials. (8)	16

13.b	Describe with neat sketch pressurized reactors and list out its merits and demerits.	16
13.b	Enumerate and explain the essential components of nuclear power plant also list out the advantages and disadvantages of nuclear power plant.	16

UNIT-IV POWER FROM RENEWABLE ENERGY

14.a	Explain the working principle of hydro electric power plant with neat sketch.	16
14.a	Explain the working principle of governing water turbine and its types with neat sketch.	16
14.a	(i) Sketch and explain the two pool tidal power plant.(8) (ii) What are the different types of Tidal power plants?(8)	16
14.a	(i) Explain the principle , construction and working of a wind power plant.(8) (ii) List out the advantages and disadvantages of a wind power plant.(8)	16
14.a	Explain the working principle of tidal power plant with neat sketch.	16
14.a	(i) Explain the construction and working of Geo thermal power plant.(8) (ii) Discuss the different system used for generating power using geothermal energy.(8)	16
14.b	Explain the working principle of solar photo voltaic with neat sketch.	16
14.b	(i) Write notes on solar thermal power plant.(8) (ii) Explain the Solar thermal central receiver system.(8)	16
14.b	Explain the working principle of geo thermal power plant with neat sketch.	16
14.b	Explain the working principle of bio gas power plant with neat sketch.	16
14.b	Explain the working principle of fuel cell power system with neat sketch.	16
14.b	(i) Explain in detail about surge tank used in hydro electric power plant. Also explain about the classification and selection of dams.(8) (ii) What are the factors to be considered while selecting a site for hydroelectric power plant?(8)	16

UNIT-V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS

15.a	(i) What do you understand by power plant economics? Discuss.(8) (ii) Explain the fixed costs and operating costs of a power station. (8)	16
15.a	Explain the different types of load distribution parameter.	16
15.a	(i) What is a tariff? (2) (ii) Discuss and compare various tariff used in practice.(14)	16
15.a	Explain the pollution control technologies including waste disposal option for nuclear power plant.	16
15.a	Explain the nuclear waste disposal methods.	16
	(i) Show the elements which contribute to the cost of the electricity?(8) (ii) Describe how the cost of power generation be reduced?(8)	16

A power station has to supply load as follows

15.	Time in Hrs	0-6	6-12	12-14	14-18	18-24	16
	Load in MW	45	135	90	150	75	

1. Find: Load curve, Load duration curve and choose suitable generating units and its operation schedule to supply the load. Explain the terms peak load, demand factor, load factor and plant use factor.(8)
2. What are load curves and load duration curves? Discuss their utility in the

   16economics of generation.(8)
3. Explain depreciation and its Significance; also explain various types of tariff system followed in India.

   16
4. The annual peak load on a 30MW power station is 25MW. The power stationsupplied loads having max demands of 10MW, 8.5MW, 5MW and 4.5MW. The annual
5. load factor is 45%. Find Average load, energy supplied by year, Diversity factor and

   16
6. demand factor.
7. A peak load on the thermal power plant is 75MW. The loads having maximum
8. demands of 35MW, 20MW, 15MW and 18MW are connected to the power plant. The capacity of the plant is 90MW and annual load factor is 0.53. Calculate the average

   16
9. load on power plant, energy supplied per year, demand factor and diversity factor.